

*Nymphaea odorata*. "Québec-Lac Supérieur, dans les lacs où les eaux mortes. Lac Calvet à St. Augustin! Lac St. Pierre!"

*Nuphar Kalmiana*. "Baie d'Hudson-Lac Supérieur; marais et mares. Bécancour!"

It should be clear then, it would seem, that Provancher's *Nuphar americana* was merely the mixed *N. advena* of his day, but with its characters chiefly drawn from descriptions of the southern plant; and that in using the name *N. americana* he was, as he said, merely substituting an appropriate name for the highly inappropriate one originally given by Aiton. There seems to be, therefore, no good reason why we should take up the name *Nymphaea americana* (Provancher) Miller & Standley for the perfectly clear and unquestioned *N. variegata* (Engelm.) G. S. Miller.

## PLURAL SEEDS IN ACORNS.

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CONCERNING the interesting note by Mr. Charles Piper Smith, in the February number of RHODORA, p. 41, upon "Plurality of Seeds in Acorns of *Quercus prinus*," it may be well to recall that one of the first, if not the first, in this country to publish a statement concerning this peculiarity was the late Mr. Thomas Meehan, of Philadelphia.

Mr. Meehan is recorded, in the Proceedings of the Academy of Natural Sciences, Philadelphia, 1871, pp. 155-157, as stating at a meeting of the Academy that, "In the case of *Quercus robur* a plurality of plantlets from one sprouting seed was not uncommon. He had found dozens in a peck of seed. These were usually in twos, but occasionally in threes. Of the last he exhibited only one specimen. He had examined a half peck of sprouting acorns of *Quercus palustris* and another of *Quercus macrocarpa*, but in these he could detect no sign of variation — each seed seemed cleft smoothly and directly through the center into two regularly equal halves." In *Quercus rubra* he did not find a plurality of embryos although numerous specimens were examined, but he refers to the frequent partial division of the cotyledons by two, three, or four fissures as being remarkable.

The observations made by Mrs. E. G. Britton, and referred to by

Mr. Smith, concerned a "double" White Oak (*Quercus alba*) seedling found on Staten Island in March, 1886. Her note was published in the "Bulletin of the Torrey Botanical Club," vol. XIII, June 1886, p. 95.

Professor Francis E. Lloyd in observations upon germinating acorns of *Quercus garryana* in western Oregon, under the title "Teratological Notes," published in the Bulletin of the Torrey Botanical Club, vol. XXII, 1895, p. 397, says "A number of acorns have been found with two fertilized and developed ovules. The presence of the supernumerary seed is betrayed by the unsymmetrical shape of the acorn. The rightful occupant — if might makes right — is usually well developed and pushes out its radicle earlier than does the intruder, which is correspondingly smaller and flattened and twisted out of shape. Occasionally, when the supernumerary seed is large, if its position is favorable it gets its radicle out of the ruptured apex first. At all events it makes a brave effort to reach soil and sunlight. A few acorns have been found in which the two plantlets had developed into two well-formed seedlings. Acorns containing more than one seed have all been found under young trees. In no case have I found such under aged trees."

Without reference to the records above cited, as well as those made by European observers, I had from my own observations considered the development of plural seeds in acorns so common, particularly in some species of oak, such as *Quercus rubra*, that I have accepted it as a perfectly natural and frequent phenomenon worthy of being considered incidentally by the arboriculturist or silviculturist, and for many years I have called the attention of my students in forestry to these common exceptions to the general rule, since they have a direct bearing upon practical silviculture.

Plural seeds appear to be most common among, if not almost confined to, species of Oaks having naturally large fruits. In northeastern America the Red Oak probably averages larger fruit than any other species and, in my experience, this tree is likely to show, more than others of the region, a larger proportion of fruits producing plural seeds. I think this tendency is indicated in our natural woods by the fact that Red Oaks so often are double trunked, a feature not confined to this species of course, in fact not rarely seen in White Oak and Chestnut Oak and others. Also it must be borne in mind that double trunks may and often do develop because of some accident to the

plumule, causing the growth of two stems from the buds in each axil of the cotyledons, or of two or more than two stems when a well developed young seedling is broken off near the ground or nipped off by some animal or insect. Two or more acorns, also, when planted close together, may produce a plural trunk effect when the trees are old. But on an examination of the trees in a piece of woodland, where all species have had seemingly equal chance, it will often be found that the Red Oak shows a larger percentage of plural trunked trees than other species.

While we have often noted plural stems in seedling Red Oaks in nursery beds no examination has ever been made to show what percentage of the fruits contained more than one fully developed seed from the six ovules which are normally produced in each flower.

Since reading Mr. Smith's note, however, I have thought it might be worth while to get actual figures. Last autumn we had collected in the Harvard Forest, at Petersham, Mass., about half a bushel of Red Oak acorns for planting this spring. These acorns have been kept in a cool place and are in good fresh condition. They were collected from good healthy trees, growing in the open, in the prime of life and vigor, broad spreading and low branched. The acorns may be described as medium sized, being about half the size of the largest sometimes found and nearly double the size of the smallest of well developed acorns found on this species. As they were collected from several trees they show some, though but little, variation in size. From over a quart of acorns taken at random from the half bushel collected last autumn at the Harvard Forest, I have cut and examined two hundred with the following results. 139 acorns with single seeds, and 61 acorns with plural seeds.

Of those with plural seeds 58 contained two developed seeds in each and 3 contained three seeds. Most of those with two seeds had both seeds strong and well developed; in those with three seeds the third seed was generally much crowded and with much reduced cotyledons, in one case being diminutive and crowded into the centre of the acorn and almost completely surrounded by the cotyledons of the two highly developed seeds. The cotyledons of each seed are often very unequal and very unsymmetrical in the fruits with plural seeds.

In all cases where two seeds were found in the acorn they were both apparently sufficiently strong and well developed to grow with nearly equal vigor and to produce two trunks. So far as could be detected

from outward appearances the acorns containing plural seeds did not differ in shape or size from those with single seeds. Possibly the larger acorns when picked out showed more tendency to double seeds but, if so, the difference was slight. Here we have an ordinary chance case which upon examination shows over 30% of the acorns with plural seeds. This is sufficient proof of the frequency of the occurrence. It may be stated that the plural seeds are always at once easily distinguished or separated by the thin testa or seed coat which surrounds and separates them, so that however crowded or mis-shapen they may be there is no reason to confuse the seeds or pairs of cotyledons which are always contained in their own testal envelope.

While some small fruited species, like *Quercus palustris*, probably rarely, if ever, produce plural seeds, it is likely that the tendency will be found in many species in varying degree; probably also influenced by the age or vigor of the trees and the ecological conditions under which they grow.

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## THE AMERICAN VARIATIONS OF STELLARIA BOREALIS.

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*Stellaria borealis* Bigelow presents in North America such pronounced variations that it has seemed desirable to attempt some organization of them, especially as the major varieties have rather definite and natural geographic ranges. Through much of the range of the species in North America the leaves are linear-lanceolate or lanceolate, the primary ones 2.5–8 cm. long; but in certain districts of both the Northeast and the Northwest there are varieties with short ovate, ovate-lanceolate or elliptic-lanceolate leaves only 0.7–2.5 cm. long.

The plants with elongate linear-lanceolate or lanceolate leaves have ordinarily been treated by American authors as *S. borealis*, which has been divided into a supposedly typical form, with the flowers axillary and the upper leaves scarcely reduced, and a variety "*alpestris*" or "*corollina*" with a loosely cymose inflorescence and the